More 7.5

Using the properties of logs:

$\log 5 = .6990$
$\log 3 = .4771$

a) find $\log 15$ $= \log(5 \cdot 3) = \log 5 + \log 3$
$.6990 + .4771 = 1.1761$

b) find $\log \frac{5}{3}$ $= \log 5 - \log 3 = .2219$

$$\begin{array}{r} .6990 \\ -\ .4771 \\ \hline .2219 \end{array}$$

c) find $\log \frac{3}{5}$ $\log 3 - \log 5$
$.4771 - .6990 = -.2219$

d) find $\log 25$ $= \log 5^2 = 2 \log 5 = 2(.6990) = 1.3980$
$\log(5 \cdot 5) = \log 5 + \log 5 = .6990 + .6990$
1.3980

Change of Base Formula:

ex: Evaluate $\log_3 8 = x$

What do we know?

$3^x = 8$

$\log 3^x = \log 8$

$x \cdot \log 3 = \log 8$

$\frac{x \cdot \log 3}{\log 3} = \frac{\log 8}{\log 3}$

$x = \frac{\log 8}{\log 3} = 1.89$

Change of Base Formula:

use base 10 or base e

$$\log_c a = \frac{\log_b a}{\log_b c}$$

$$= \frac{\log a}{\log c} \qquad = \frac{\ln a}{\ln c}$$

Example: $\log_7 205$

$$= \frac{\log 205}{\log 7} \qquad 2.74$$

$$\frac{\ln 205}{\ln 7} = 2.74$$

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Pg 510 7 – 10, 12, 14, 45, 46, 51, 58, 61

APPROXIMATING EXPRESSIONS **Use $\log 4 \approx 0.602$ and $\log 12 \approx 1.079$ to evaluate the logarithm.**

7. $\log 3$ **8.** $\log 48$ **9.** $\log 16$ **10.** $\log 64$

11. $\log 144$ **12.** $\log \frac{1}{3}$ **13.** $\log \frac{1}{4}$ **14.** $\log \frac{1}{12}$

CHANGE-OF-BASE FORMULA **Use the change-of-base formula to evaluate the logarithm.**

45. $\log_4 7$ **46.** $\log_5 13$ **47.** $\log_3 15$ **48.** $\log_8 22$

49. $\log_3 6$ **50.** $\log_5 14$ **51.** $\log_6 17$ **52.** $\log_2 28$

53. $\log_7 19$ **54.** $\log_4 48$ **55.** $\log_9 27$ **56.** $\log_8 32$

57. $\log_6 \frac{24}{5}$ **58.** $\log_2 \frac{15}{7}$ **59.** $\log_3 \frac{9}{40}$ **60.** $\log_7 \frac{3}{16}$

61. **ERROR ANALYSIS** *Describe* and correct the error in using the change-of-base formula.

$$\log_3 7 = \frac{\log 3}{\log 7}$$ ✗